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NOTE ON PRIME NUMBERS.

In my review of the first volume of Dickson's *History of the Theory of Numbers* in this MONTHLY (*1919,* 402), I quote from page 425 of the *History* the conjecture of M. Cantor (correctly reproduced from his paper) that three successive primes are not in arithmetical progression unless one of them is 3. Through the kindness of Professor F. H. Loud my attention has been called to the fact that the conjectured theorem is false. In fact from a table of primes it is easy to find sets of three consecutive primes with common difference 6, for example. The four primes 251, 257, 263, 269 are successive and are in arithmetical progression.

R. D. CARMICHAEL.

Plane Trigonometry and Numerical Computation. By J. W. YOUNG and F. M. MORGAN. New York, Macmillan, 1919. 12mo. 7 + 122 pp. Price $1.25.

The Preface: "Ever since the publication of our *Elementary Mathematical Analysis* (The Macmillan Co., 1917) we have been asked by numerous teachers to publish separately, as a textbook in plane trigonometry, the material on trigonometry and logarithms of the text mentioned.

"The present textbook is the direct outcome of these requests. Of course, such separate publication of material taken out of the body of another book necessitated some changes and an introductory chapter. As a matter of fact, however, we have found it desirable to make a number of changes and additions not required by the necessities of separate publication. As a result fully half of the material has been entirely rewritten, with the purpose of bringing the text abreast of the most recent tendencies in the teaching of trigonometry.

"There is an increasing demand for a brief text emphasizing the numerical aspect of trigonometry and giving only so much of the theory as is necessary for a thorough understanding of the numerical applications. The material has therefore been arranged in such a way that the first six chapters give the essentials of a course in numerical trigonometry and logarithmic computation. The remainder of the theory usually given in the longer courses is contained in the last two chapters.

"More emphasis than hitherto has been placed on the use of tables. For this reason a table of squares and square roots has been added. Recent experience has emphasized the applications of trigonometry in navigation. We have accordingly added some material in the text on navigation, have introduced the haversine, and have added a four-place table of haversines for the benefit of those teachers who feel that the use of the haversine in the solution of triangles is desirable. The material can, however, be readily omitted by any teacher who prefers to do so."

NOTES.

The fifth quinquennial *Table des matières* of *Revue semestrielle des publications mathématiques* was published in 1918. It covers volumes 21–25 (1913–1917).

Noordhoff of Groningen published in 1918 the second volume of the *Oeuvres complètes de Thomas Jan Stieltjes* which are being issued under the auspices of the Amsterdam mathematical society. It is a quarto volume of over six hundred pages. The first volume, which was about one-third smaller, appeared in 1914.

The fourth edition of Appell's *Traité de mécanique rationnelle,* tome 1, was published in 1919. It contains about five pages more than the third edition.—Recent publications by R. de Montessus de Ballore are: *Introduction à la théorie des courbes gauches algébriques* (Paris, Croville-Morant, 1918); the sixth enlarged and thoroughly revised edition of the elementary algebra part of C. de Comberousse's *Cours de mathématiques* (Paris, Gauthier-Villars, 1919); and the *Yearbook of the Universities* to which we have already made reference (*1919,* 358).

Recent catalogues of second hand mathematical books: No. 97 (495 titles in mathematics and physics), Galloway and Porter, Cambridge, England; No. 773 (3336 titles in exact and applied science), Henry Sotheran and Co., 140 Strand, W. C. 2, London. The latter catalogue includes the library of Olaus Henrici.

Among the articles in *Revista matemática Hispano-Americana,* September, 1919 are: "El tratado de la logarítmica de Juan Caramuel" by D. F. DIÉGUEZ pp. 203–212 (including facsimiles of two pages of tables); and 'La teoría de los grupos en la enciclopedia matemática" by G. A. MILLER, pp. 229–232. Cf. *1919,* 302.

The frontispiece of *Popular Astronomy* for November, 1919 is a group picture of members and visitors at the Ann Arbor meeting of the American Astronomical Society, September 2–5. Among those in the group are the following members of the Association: E. W. Brown, W. D. MacMillan, F. R. Moulton, and E. D. Roe, Jr. Elsewhere in the issue is a fine portrait of Benjamin Baillaud (director of the Paris observatory, and first president of the International Astronomical Union), and a picture of the Palais des Académies where the meetings of the International Research Council were held in Brussels last July.

Science, for December 19, records that at a recent meeting of the corporation of Yale University it was voted "to extend the sincere congratulations of the corporation to Professor ERNEST BROWN on the completion of his monumental work on the *Tables of the Motion of the Moon,* and to assure him that the university considers the work that he has done on these volumes as among the most important scientific contributions ever made by an officer of Yale University."

G. Bell and Sons, London, have announced the publication of *Nomography* by S. BRODETSKY, and of *Differential Equations and their Applications* by H. PIOGGIO.— Dunod, Paris, has published a French translation, by A. E Gérard, of SILVANUS P. THOMPSON'S *Calculus Made Easy* (first published anonymously in 1910) with the title: *Le calcul intégral et différentiel à la portée de tout le monde.*

Engineering Education. Essays for English. Selected and edited by R. P. BAKER (New York, Wiley, 1919) includes the following: Under the heading The Origins of Engineering Education, "Evolution of the scientific investigator" by S. Newcomb, pages 3–28 (reprinted from the Smithsonian Institution *Report,* 1904); under the heading The Bases of Engineering Education—Mathematics, "The place of mathematics in engineering practice" by W. H. White, pages 103–112 (reprinted from *Nature,* September 19, 1912), and "On the relation of mathematics to engineering" by A. Ranum, pages 113–121 (reprinted from the *Sibley Journal of Engineering,* January, 1914). Each essay is preceded by a brief biographical sketch of the author.

The following paragraph appeared in *Nature* for November 27:

> "The unfailing energy of Prof. Pearson's department at University College, London, has now resulted in the production of a series of tracts published by the Cambridge University Press.

The objects of this new series are not only to publish new tables (as well as to republish old and inaccessible tables), but also in due course to issue works on interpolation, mechanical quadratures, calculating machines, and other matters of importance to the practical computer. The first of the series is before us, and is entitled *Tables of the Digamma and Trigamma Functions*, by ELEANOR PAIRMAN. The work contains tables of the logarithmic derivate of the Gaussian Π-function and of its derivate, in addition to some useful miscellaneous information concerning these two functions. The functions are tabulated to eight places of decimals at intervals of 0.02 from 0 to 16, with tables of second differences. There seems no doubt that this series will be of extreme value to computers, and we must feel deep gratitude to Prof. Pearson for using the resources at his disposal in producing it. Finally, it should be said that the appearance of the first of the series is up to the standard which we have grown accustomed to expect from the Cambridge University Press."

ARTICLES IN CURRENT PERIODICALS.

ANNALS OF MATHEMATICS, 2d series, volume 21, no. 1, September, 1919: "Investigation of a class of fundamental inequalities in the theory of analytic functions" by J. L. W. V. Jensen [translation from the Danish by T. H. Gronwall], 1–29; "Functions of limited variation in an infinite number of dimensions" by P. J. Daniell, 30–38; "A new sequence of integral tests for the convergence and divergence of infinite series" by R. W. Brink, 39–60; "Calculation of the complex zeros of the function $P(z)$ complementary to the incomplete gamma function" by P. Franklin, 61–63; "Total differentiability" by E. J. Townsend, 64–72.

ATHENAEUM, 1919, November 14: "Einstein's theory of gravitation" by X., 1189 [Last paragraphs: "Einstein supposes that space is euclidean where it is sufficiently remote from matter, but that the presence of matter causes it to become slightly non-euclidean—the more matter there is in the neighbourhood, the more space will depart from Euclid. By the help of this hypothesis, together with his previous theory of relativity, he deduces gravitation—very approximately, but not exactly, according to the Newtonian law of the inverse square.

"The minute differences between the effects deduced from his theory and those deduced from Newton are measurable in certain cases. There are, so far, three crucial tests of the relative accuracy of the new theory and the old.

"(1) The perihelion of Mercury shows a discrepancy which has long puzzled astronomers. This discrepancy is fully accounted for by Einstein. At the time when he published his theory, this was its only experimental verification.

"(2) Modern physicists were willing to suppose that light might be subject to gravitation, *i.e.*, that a ray of light passing near a great mass like the sun might be deflected to the extent to which a particle moving with the same velocity would be deflected according to the orthodox theory of gravitation. But Einstein's theory required that the light should be deflected just twice as much as this. The matter could only be tested during an eclipse among a number of bright stars. Fortunately a peculiarly favourable eclipse occurred this year. The results of the observations have now been published, and are found to verify Einstein's prediction. The verification is not, of course, quite exact; with such delicate observations that was not to be expected. In some cases the departure is considerable. But taking the average of the best series of observations, the deflection at the sun's limb is found to be 1.98″, with a probable error of about 6 per cent., whereas the deflection calculated by Einstein's theory should be 1.75″. It will be noticed that Einstein's theory gave a deflection twice as large as that predicted by the orthodox theory, and that the observed deflection is slightly *larger* than Einstein predicted. The discrepancy is well within what might be expected in view of the minuteness of the measurements. It is therefore generally acknowledged by astronomers that the outcome is a triumph for Einstein.

"(3) In the excitement of this sensational verification, there has been a tendency to overlook the third experimental test to which Einstein's theory was to be subjected. If his theory is correct as it stands, there ought, in a gravitational field, to be a displacement of the lines of the spectrum towards the red. No such effect has been discovered. Spectroscopists maintain that, so far as can be seen at present, there is no way of accounting for this failure if Einstein's theory in its present form is assumed. They admit that some compensating cause *may* be discovered to explain the discrepancy, but they think it far more probable that Einstein's theory requires some essential modification. Meanwhile, a certain suspense of judgment is called for. The new law has been so amazingly successful in two of the three tests that there must be something valid about it, even if it is not exactly right as yet.